

Small group velocity photonic crystal waveguides for group delay and dispersion management

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As was shown previously, there is a bandwidth of quasi-constant small group velocity in photonic crystal line defect waveguides sufficient for the single WDM channel operation [1]. In this paper, such waveguides are used as a basis for different time delay and dispersion control components with a size reduction proportional to the group velocity decrease. We consider an example of a waveguide with the group velocity 0.02 speed of light and the bandwidth of approximately 600GHz. The propagation through small group velocity waveguides of different lengths can have variable group delay without second order dispersion. The same waveguides with linearly chirped parameters [2] show constant second order dispersion in reflection with vanishing third order dispersion. The coupling of the small group velocity waveguide to a waveguide with normal group velocity gives more flexibility for the component design. The input and output channels can be separated in this case. The time delay and dispersion tuning is possible.

- [1] A. Yu. Petrov and M. Eich, *Appl. Phys. Lett.*, **85**, 4866 (2004).
- [2] D. Mori and T. Baba, *Appl. Phys. Lett.*, **85**, 1101 (2004).